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AUTHOR Lajubutu, Oyebanjo A.; Yang, Faxian
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ABSTRACT

The goals of this study of student outcomes were to find ways to better manage enrollments, husband teaching and administrative resources, reduce attrition, and better understand the needs and expectations of students. The study examined data for 2,262 first-time, associate degree-seeking students entering a mid-sized rural college in the mid-Atlantic region during the fall semesters of 1991-93. After eight semesters, students were classified as: (1) achievers: students earning a degree and transferring to a four-year college, students earning a degree, students transferring to a four-year college without earning a degree, students who had not graduated but had earned at least 30 credits; (2) persisters: students still currently enrolled; and (3) nonachievers: students leaving college without graduating or transferring or earning at least 30 credits. Data was analyzed for overall student outcomes and for ethnicity, college preparation, lag time between high school graduation and college entry; age; and curriculum choice. Logistic regression of the data found that 34 percent of students were achievers; that is, those graduating, transferring, or attaining sophomore status in good standing; 24 percent were persisters. One of the most striking findings was that students who changed curriculum were more likely to be successful. Thirteen data tables supplement the text. (Contains 8 references.) (CH)

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Running head: PREDICATIVE FACTORS FOR STUDENTS SUCCESS

Predictive Factors for Students' Success At a Mid-Size Rural Community College

Presented by

Oyebanjo A. Lajubutu
Director of Institutional Research

and

Faxian Yang
Research Analyst

Office of Institutional Research
Harford Community College
Bel Air, Maryland 21015
Phone: (410)836.4344

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Dolores Vura
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Running head: PREDICATIVE FACTORS FOR STUDENTS SUCCESS

Predictive Factors for Students Success At a Mid-Size Rural Community College

Abstract

Three semesters decline of fall enrollment and lower success rates of student prompted the development of an enrollment management initiative at Harford Community College (HCC). Evaluating student success can serve many purposes, and recent Student-Right-To-Know legislation suggests that interest in outcomes research is likely to intensify. Student achievers were defined as those graduating, transferring, or attaining sophomore status in good standing within eight semesters after entering. Stepwise logistic regression was used to explore factors which most- and least-influenced students' success. The success rates of 2,262 first-time, associate degree-seeking students entering the college during the fall semesters of 1991 through 1993 were examined and classified into six outcomes typology. The results show that more than one-thirds (34%) of the students were achievers. Another 24% of the students are still persisting. One of the most striking findings is that students who change curriculum are more likely to be successful than those who entered with an original curriculum (61% vs. 25%). The findings of the study should be of significant importance to academic administrators and decision-makers who struggle with the fundamental issue of institutional quality, academic planning and enrollment management.

Introduction

The history of American community colleges in higher education can be tracked back to a century ago. Committed to their mission of open admission and accessibility, community colleges serve students lacking the basic skills, study habits, and support networks that facilitate success (Clagett, 1996). In fall 1996, according to *The Chronicle of Higher Education* issue of August 29, 1997, over 5.3 million students studied at 1,577 community colleges in America (1,047 public two year, 415 private two year, and 115 university branch campus). In the state of Maryland, close to 50% of the total undergraduates are attending community colleges. More than four out of ten first-time, full-time freshmen are attending community colleges.

At Harford Community College (HCC), three semesters decline of fall enrollment and low level of student success among degree-seeking students prompted major organizational alignment, and the development of an enrollment management initiative. As a result, a Dean of Enrollment Policy and Planning was hired to coordinate this effort. We have undertaken this research to provide information that can help the college manage the decisions or actions in the enrollment management plan.

Purpose of the Study

The study of student outcomes can serve many purposes. They can be important diagnostic tools pointing toward questions which deserve further study. Perhaps more important, the study of student outcomes demonstrates commitment to public accountability, and strengthens an institution's capacity for shaping broader assessment programs. Some recent trends in educational policy suggest that the interest in student outcomes is likely to continue and even intensify:

1. The uncertainty imposed by demographic change notably the decline in the college-going population of Harford county has raised the stakes for outcomes research. The volatile admissions environment (this college, for example, attracted 102 fewer

freshman in fall 1997 than it did in fall 1993) makes understanding student outcomes increasingly important from an enrollment management perspective.

2. As the competition for public funds intensifies student attrition can be very costly. As Terenzini (1987) pointed out that retaining a student who might otherwise withdraw means not having to recruit a replacement. Resources required to register, advise, financially support, counsel, teach, and recreate a student who stays are the same as those for the student who eventually withdraws.
3. Student attrition can carry other costs, as well. Students who "succeed" tend to be satisfied alumni to whom the college can turn for financial and other forms of help. Students who do not find success, however, can be indifferent or even hostile to the college's needs. Therefore, community colleges, must attend to the experiences of students who will one day return to the community from which the institution draws its support.
4. Ours is often a world of unintended consequences: tighter budgets and stronger economy may lead to reduced enrollment, but the students who stay may be more expensive to teach than those who leave. What became of HCC students as they moved through the College? How closely did their HCC experiences match their expectations? How did the need for remediation affect outcomes? What effect does the lag time between high school graduation and college entry has on student achievement? What are the differences in success or achievement rates between traditional and nontraditional students?

For all these purposes we have undertaken this study. It offers substantial new information about our students. It classifies students according to "outcome", and attempt to predict factors which can most- and least influenced students' success.

Research Methods

The universe of reference for the study are the first-time, associate degree-seeking students entering the college during the fall semesters of 1991 through 1993. Eight semesters after their first entry we looked at their success rates, and assigned them to one of six possible student outcomes typology outlined below. Student achievers were defined as those graduating, transferring, or attaining sophomore status in good standing.

The data were taken from the longitudinal student tracking files developed by the Office of Institutional Research. This file merges the enrollment files, the degrees files and the transfer student files during the eight semester period under investigation.

Student Outcomes Typology

What became of these students as they moved through the College? How closely did their HCC experiences match their expectations? To answer these questions, we developed outcomes typology similar to Clagett in 1996:

1. Award and transfer: the percentage of students who earn a degree and transfer to a four-year public college or university in Maryland.
2. Award/no transfer: the percentage of students earning a degree for whom there is no evidence of transfer.
3. Transfer/no award: the percentage of students transferring to a four-year public college or university in Maryland without earning an award.
4. Sophomore status in good standing: the percentage of students who have not graduated but have earned at least 30 credits with a cumulative grade point average of 2.0 or above and for whom we have no evidence of transfer.
5. Persisters: the percentage of students still currently enrolled.

6. Non-achievers: the residual of the above five categories, i.e., the percentage of students exiting the college without graduating or transferring, and without earning 30 credits in good standing.

The first four categories were classified as achievers, while the residual category was classified as non-achievers. Within this conceptualization, two sets of analysis were generated. First, eight semesters outcomes of the entry cohorts were assessed. Second, the stepwise logistic regression was used to investigate the relationship between achievers/non-achievers and a set of explanatory variables including ethnicity, age, sex, lag between high school graduation and college entry, study objective, attendance status, cumulative credit hours, cumulative GPA, semester credit hours attempted, semester GPA, curriculum choice, and remediation needs, etc.

Research Findings

During the fall semesters of 1991 through 1993, a total of 2,272 associate degree-seeking students began college careers at Harford Community College. By and large, they were "traditional" undergraduates: 52% were aged 18 or younger, 87% described themselves as "white", and 87% came to the College to prepare for a first or different career, or prepare to transfer to a four-year college.

Overall Student Outcomes

The optimism of these entering students was, to some extent, realized. More than one-thirds (34%) were achievers. Another 24% were still persisting, perhaps still to earn a HCC degree, and about 42% were non-achievers and seemed to have dropped out by the end of the eight semester (see Table 1).

In interpreting these findings, however, it is important to keep in mind that the "non-achievers" category is subject to many meanings. Unlike "achievers", which is relatively unambiguous, students who are non-achievers may have done so for many reasons, including

Table 1 Student Achievement by Outcomes

Outcomes After Eight Semesters	Number	Percent
Achievers	782	34%
Award and transfer	26	1%
Award, no transfer	304	13%
Transfer, no award	289	13%
Sophomore w/ 2.0+ GPA	163	7%
Persisters: <30 credits w/ 2.0+ GPA	535	24%
Non-Achievers	955	42%
Total	2,272	100%

academic difficulty. A student might voluntarily withdrawn--and be counted as a "non-achiever"--even though his or her academic performance was leading toward dismissal. This seems to have been the case with respect to the non-achievers. The mean cumulative grade point averages (GPAs) for the non-achievers (0.59) were well below the minimum necessary to maintain good academic standing (2.00).

Variation Within the Pattern

For the universe as a whole, then, the pattern was fairly straightforward: nearly three in ten of those who entered were achievers, most eight semesters after entering. About four-tenth dropped out somewhere along the way. Within this larger pattern, however, substantial differences exist.

• We examined this pattern within five major factors: ethnicity, as reported by the students themselves; college preparation as represented by their placement test scores in reading, writing and math; lag time between high school graduation and college entry; age; and curriculum choice. In order to increase student retention the college must be able to identify those students at greatest risk, and it must be able to evaluate admissions, counseling, and other policies in

practical terms. In this sense, examining the relationships among these variables and student outcomes is important.

Student Outcome by Ethnicity

In terms of outcomes, students tended to cluster into two groups: one consisting of white students and the other consisting of black students. Please note that because of their very small numbers--20 or fewer within a cohort of more than 2,000-- data are not reported here for other categories of ethnicity. Because nearly all the students in the cohort were white, the overall success rate (34%) closely parallels that for white students (36%). Black students, however, showed a much different pattern-- their success rate was 19% (see Table 2).

Table 2 Outcomes by Ethnicity

Outcomes After Eight Semesters	Black		White	
	Number	Percent	Number	Percent
Achievers	28	19%	715	36%
Persisters: <30 credits w/2.0+GPA	40	28%	470	24%
Non-Achievers	77	53%	791	40%
Total	145	100%	1,976	100%

The period over which students were still persisting also varied according to student ethnicity For white students, 24% were active eight semesters after entering, compared with 28% of blacks. It is possible, therefore, that ultimate success rates for these groups could rise a few points above those posted after eight semesters.

Student Outcome by College Preparation

Common sense suggests that students' success in college depend on a very great extent on their success in high school and preparation for college. Unlike, universities or senior four year colleges, where students are admitted largely on the basis of their achievement in high school, community colleges have open admissions and, therefore do not have the luxury of this

selection process. Generally students come to community colleges without high school diplomas or transcript and may not necessarily have a SAT score. Hence a measure of their academic credentials is difficult to obtain.

For the purpose of this study, we measure student preparation for college by examining their placement test scores in reading, writing and mathematics. Hence, we grouped students into three groups: those not needing remediation, those needing remediation in one area, or those needing remediation in two or more areas. Note that, consistent with the College policy in effect at the time, students taken less than 6 credits are exempted from taking the tests. Still yet we have valid scores for about 60% of the cohort.

As might be expected, the students needing no remediation in reading, writing, and mathematics achieved at a rate higher than those who need remediation in one area (54% vs. 46%). Nearly six out of ten (58%) of the students needing remediation in two or more areas were non-achievers (see Table 3).

Table 3 Student Outcomes by Remediation Need

Outcomes After Eight Semesters	No Need		One Area of Need		Two or more Areas of Need	
	Number	Percent	Number	Percent	Number	Percent
Achievers	243	54%	297	46%	73	26%
Persisters: <30 credits w/ 2.0+ GPA	80	18%	100	16%	44	16%
Non-Achievers	125	28%	248	38%	165	58%
Total	448	100%	645	100%	282	100%

Student Outcome by Time of Entry (Lag)

What effect does the lag time between high school graduation and college entry has on student achievement? We gleaned from the data that the students who began their college career the semester after graduation from high school are more successful (44% success rate) than those who took some time out before attending college (see Table 4).

Table 4 Outcomes by Time of Entry (Lag)

Outcomes After Eight Semesters	No Lag	One Year Lag	Two Years Lag	Three Years Lag	Four Years Lag	Five Years Lag
Achievers	44%	20%	12%	12%	17%	18%
Persisters: <30 credits w/ 2.0+ GPA	17%	29%	39%	31%	31%	38%
Non-Achievers	39%	51%	49%	57%	52%	44%
Total	100%	100%	100%	100%	100%	100%

Twenty percent of the students that waited one year before entry to the college were achievers, and as the time of entry gets longer, lower achievement or success rates were displaced.

Student Outcome by Age-Group

For the cohort as a whole, more than half of the students were traditional students aged 18 or younger. Is there any differences in achievement rates between traditional and nontraditional students? We found that traditional students are more likely to be successful than nontraditional students (see Table 5). The achievement rate for students aged 18 or younger was

Table 5 Outcomes by Age-Group

Outcomes After Eight Semesters	< 19 years	19 - 21 Years	22 - 24 Years	25 - 34 Years	35 - 45 Years	46 or more Years
Achievers	47%	25%	15%	20%	21%	10%
Persisters: <30 credits w/ 2.0+ GPA	16%	25%	32%	39%	30%	31%
Non-Achievers	37%	50%	53%	41%	49%	59%
Total	100%	100%	100%	100%	100%	100%

47%; for those 19-21 age-group it was 25%. Among all the age-groups, greater percentage of the 25-34 age-group is still persisting.

Student Outcome by Choice of Curriculum

The four variables discussed above--ethnicity, college preparation, entry lag, and age--are associated with students before they begin their careers at the College. The relationships among these entry characteristics and student outcomes can offer insight into some of the factors which might contribute to student success in college.

Other factors, however, involve what happens after students arrive on campus. The decisions they make--about courses, study habits, and goals after college, to name a few--can have a powerful impact on their college experience. While this study was not designed to assess the full relationship between the institution and the student, one variable--student curriculum--reflects some very important student decisions.

In studying the relationship between outcomes and curriculum, however, it is important to keep in mind that students often move from one curriculum to another. In fact, we found that after eight semesters one out of four students had moved to a curriculum different from the one to which they had been admitted (see Table 6). In this study, therefore, we looked at the

Table 6 Student Outcome by Curriculum

Outcomes After Eight Semesters	Same Curriculum		Change Curriculum	
	Number	Percent	Number	Percent
Achievers	430	25%	342	61%
Persisters: <30 credits w/ 2.0+ GPA	414	24%	109	19%
Non-Achievers	854	51%	113	20%
Total	1,698	100%	564	100%

relationship between curriculum and student outcome in terms of both original/same curriculum (i.e., the curriculum choice of entry) and final/change curriculum (i.e., the curriculum of record when the student exiled the College, for whatever reason).

In terms of original and final curriculum, achievement rates varied substantially. The highest achievement rates occurred among students who changed curriculum during the eight

semester period. As shown in Table 6, sixty-one percent of students who changed curriculum are achievers, compared with 25% for students who remained in the same major they originally applied for when they entered the college. Very striking to know is that about one-fourth (24%) of the those who chose to continue with their original curriculum are still persisting compared to 19% of those who changed. This distinction is even clearer when we look at the non-achievers between these two groups. The non-achievers rate for students with original curriculum was higher than those students who changed (51% vs. 20%).

Exploratory Analysis

Stepwise logistic regression was used to determine the correlation between the set of independent variables and dependent variable (student achievement or not). Logistic regression is appropriate for studies involving binary dependent variable in order to determine the statistical relationships between the dependent and independent variables.

Definition of Logistic Regression

Binary response variable, such as yes or no, successful or non-successful, can be seen a lot in the researches of social science and health science. Agresti defined what binary response variable and logistic regression model were in 1990:

> Let Y denote a binary response variable. Denoting the two outcomes by 0 and 1 gives the Bernoulli random variable with mean
>
> $$E(Y) = 1 \times P(Y=1) + 0 \times P(Y=0) = P(Y=1)$$
>
> For a binary response, the regression model
>
> $$E(Y) = (x) = \alpha + \beta x$$
>
> is called a linear probability model. When observations on Y are independent, this model is a GLM with identity link function. Because of the structural problems with the linear probability model, it is more fruitful to study models implying a curvilinear relationship between x and $\pi(x)$. When we expect a monotonic relationship, the S-shaped curves are natural shapes for regression curves. A function having this shape is

$$\pi(x) = \frac{\exp(\alpha + \beta x)}{1 + \exp(\alpha + \beta x)}$$

called the logistic regression function. (p. 84-85)

$\pi(\mathbf{x})$ is denoted as probability.

Criteria for Assessing Model Fit

Residuals and R- Squared measures are two common methods to test the fitted model. The difference between the number of parameters of the expanded model and the main effects model is the value of degree of freedom.

Residuals. The "*Residual Chi - Square*" is the score goodness-of-fit statistic. McCullagh and Nelder (1989) emphasized the role of residuals as exploring the adequacy of fit of a model:

> For Normal models we can express the dependent variate in the form
>
> $$y = \hat{\mu} + (y - \hat{\mu})$$
>
> i.e. datum = fitted value + residual. Residuals can be used to explore the adequacy of fit of a model, in respect of choice of variance function, link function and terms in the linear predictor.(p.37)

R- Squared Measures. Agresti (1990) described the importance of R-Squared measures as one of diagnostics methods in logistic regression:

> In regression models, R^2 give the proportional reduction in variation in comparing the conditional variation of the response to the marginal variation. It describes the strength of association between the model's linear predictor and the response, with R^2 =1 when we can predict the response perfectly.(p.110)

The Analysis by Stepwise of Logistic Regression

Thirteen variables were included in the full model. They were the following:

1. Age: student's age at entry.
2. Ethnicity: student's ethnicity.

3. ATT_CATE: attendance status --full-time or part-time.
4. Student Level: freshman or sophomore.
5. Reason (Ra_New): study objective.
6. Lag: the time period between high school graduation and entry at the college.
7. Load: credit hour attempted the first semester.
8. SGPA: GPA in the last semester.
9. CGPA: cumulative GPA at the start of the last semester.
10. SCRE: credit hours taken in the last semester.
11. CCRE: cumulative credit hours attempted at the start of the last semester.
12. Original Curriculum: curriculum at entry to the college.
13. Change of Curriculum: change of curriculum.

In order to make the model become more efficient, stepwise logistic regression was used in the analysis. McCullagh *et al* (1989) believed

> The simplest model, the null model, has one parameter, representing a common μ for all the *y*s; the null model thus consigns all the variation between the *y*s to the random component. At the other extreme the full model has n parameters, one per observation, and the μs derived from it match the data exactly. The full model thus consigns all the variation in the *y*s to systematic component leaving none for the random component. In practice the null model is usually too simple and the full model is uninformative because it does not summarize the data but merely repeats them in full. (p.33)

Therefore, only most influential variables were selected in the research. The following formula was used during stepwise logistic regression:

$$P = \frac{e^{(\alpha+\beta_1 x_1+\beta_2 x_2+\ldots+\beta_n x_n)}}{1+e^{(\alpha+\beta_1 x_1+\beta_2 x_2+\ldots+\beta_n x_n)}} = \frac{1}{1+e^{-(\alpha+\beta_1 x_1+\beta_2 x_2+\ldots+\beta_n x_n)}}$$

Significance level in the research was 0.05.

The Cohort of 1991

After three steps of stepwise logistic regression, three variables, CCRE , SCRE, and CGPA were selected. The Rsquare was improved when final model was set. Residual Chi - Square was greatly reduced when the three variables entered (see Table 7). While Residual

Table 7 Stepwise Procedure for the Students in Cohort 1991

Step	Entered	Removed	RSquare	Residual Chi - Square	DF
0				469.5721	13
1	CCRE		0.6559	92.8922	12
2	SCRE		0.6955	30.7067	11
3	CGPA		0.7044	22.1899	10

Note: No (additional) variables met the 0.05 significance level for entry into the model.

Chi - Square kept reducing until no additional variables met the 0.05 significance level for entry into the model (see Table 8).

Table 8 Analysis of Maximum Likelihood Estimates of Cohort 1991

Variable	DF	Parameter Estimate	Pr > Chi - Square
Intercept	1	-9.4982	0.0001
CGPA	1	1.8475	0.0004
CCRE	1	0.1643	0.0001
SCRE	1	0.3057	0.0001

Based on parameter estimate in table 8, the model equation can be written as follow:

$$\text{Logit}(\pi_{hi}) = -9.4982 + 1.8475\ \text{CGPA} + 0.1643\ \text{CCRE} + 0.3057\ \text{SCRE}$$

For example, after studying at the college for eight semesters, one student's CGPA=2, CCRE= 30, and SCRE = 12, then

$$\text{Logit}(\pi_{hi}) = -9.4982 + 1.8475 \times 2 + 0.1643 \times 30 + 0.3057 \times 12 = 2.7942$$

$$P = \frac{1}{1 + e^{-2.7942}} = 0.9424 = 94.24\%$$

this student might become achievable student.

Another example, if after studying at the college for eight semesters, one student's CGPA=1.3, CCRE= 15, and SCRE = 6, then

$$\text{Logit}(\pi_{hi}) = -9.4982 + 1.8475 \times 1.3 + 0.1643 \times 15 + 0.3057 \times 6 = -2.7977$$

$$P = \frac{1}{1 + e^{2.7977}} = 0.0574 = 5.74\%$$

this student might become non achievable student.

According to above stepwise logistic analysis, cumulative GPA at the start of the latest semester (CGPA), cumulative credit hours attempted at the start of the last semester (CCRE), and semester credit hour in the last semester (SCRE) were three success factors influencing students achievement at Harford Community College. The higher CGPA, CCRE, SCRE, the more likely they would successful.

The Cohort of 1992

After four steps of stepwise of logistic regression, two variables, CCRE and CGPA were selected. The Rsquare increased. While Residual Chi - Square kept reducing until no additional variables met the 0.05 significance level for entry into the model (see Table 9). The probability larger than Chi -Square for intercept and two variables were less than 0.05 (see Table 10). Two variables were selected, and used as an example to illustrate the model. The model equation can be written as follow:

$$\text{Logit}(\pi_{hi}) = -72.7634 + 0.1474\ \text{CCRE} + 34.2492\ \text{CGPA}$$

Table 9 Stepwise Procedure for the Students in Cohort 1992

Step	Entered	Removed	RSquare	Residual Chi - Square	DF
0				446.2559	13
1	CCRE		0.6754	81.3474	12
2	CGPA		0.7384	5.7265	11
3	Load		0.7408		10
		Load	0.7384		11

Table 10 Analysis of Maximum Likelihood Estimates in Cohort 1992

Variable	DF	Parameter Estimate	Pr > Chi -Square
Intercept	1	-72.7634	0.0042
CCRE	1	0.1474	0.0017
CGPA	1	34.2492	0.0062

For example, after studying at the college for four years, one student's if CCRE = 30, CGPA = 2.5, then

$$\text{Logit}(\pi_{hi}) = -72.7634 + 0.1474 \times 30 + 34.2492 \times 2.5 = 17.2816$$

$$P = \frac{1}{1+e^{-17.2816}} = 0.9999 = 99.99\%$$

According to above stepwise logistic analysis, cumulative credit hours attempted at the start of the last semester (CCRE) and cumulative GPA at the start of the last semester (CGPA) were two success factors influencing students achievement at Harford Community College. The higher CGPA, CCRE, SCRE, the more likely they would successful.

The Cohort of 1993

After three steps of stepwise of logistic regression, three variables, CGPA, CCRE, SCRE were selected. The Rsquare was improved when final model was set. Residual Chi - Square kept reducing until no additional variables met the 0.05 significance level for entry into the model (see Table 11).

Table 11 Stepwise Procedure for the Students in Cohort 1993

Step	Entered	Removed	RSquare	Residual Chi - Square	DF
0				513.3513	13
1	CCRE		0.6504	103.5285	12
2	CGPA		0.6898	26.6225	11
3	SCRE		0.6947	14.7955	10

The probability larger than Chi -Square for intercept and three variables were less than 0.05 (see Table 12).

The three variables were also used as examples to illustrate the model.

Table 12 Analysis of Maximum Likelihood Estimates in Cohort 1993

Variable	DF	Parameter Estimate	Pr > Chi -Square
Intercept	1	-10.0252	0.0001
CGPA	1	2.8033	0.0001
CCRE	1	0.1125	0.0001
SCRE	1	0.1698	0.0022

The model equation can be written as follow:

$$\text{Logit}(\pi_{hi}) = -10.0252 + 2.8033\ \text{CGPA} + 0.1125\ \text{CCRE} + 0.698\ \text{SCRE}$$

For example, after studying at the college for four years, one student's CGPA = 2.4, CCRE = 30, and SCRE = 9, then

$$\text{Logit}(\pi_{hi}) = -10.0252 + 2.8033 \text{ X } 2.4 + 0.1125 \text{ X } 30 + 0.698 \text{ X } 9 = 6.3597$$

$$P = \frac{1}{1 + e^{-6.3597}} = 0.9983 = 99.83\%$$

According to above stepwise logistic analysis, cumulative grade point average at the start of the last semester(CGPA), cumulative credit hours attempted at the start of the last semester (CCRE), and credit hour in the latest semester (SCRE) were three factors influencing students achievement at Harford Community College.

Association of Predicted Probabilities and Observed Responses

Concordant in the all three cohorts were over 99.0%. This indicated that the subject ranking higher on variable X (CCRE, CGPA, SCRE) also ranks higher on variable Y (indicator of achiever). The definition of the indicator was that achiever was 1 and non-achiever was 0 (see Table 13).

Table 13 Association of Predicted Probabilities and Observed Responses

	1991	1992	1993
Concordant	99.7%	99.8%	99.3%
Discordant	0.3%	0.2%	0.6%
Tied	0.0%	0.0%	0.1%

Conclusion

This study has shown the success rate of first-time students of fall semesters of 1991 through 1993 eight semesters after entry. Overall, one-thirds of the students were achievers, i.e., they had either graduated, transfer or attain sophomore status in good standing. Several

variations in this pattern displaced that white students were more likely to be successful than black students; students directly taken college level courses were more likely to be successful than those needing one or more areas of remediation; students who began college careers immediately after high school graduation were more likely to be successful than those who waited one or more years before entry; traditional students were more likely to be successful than nontraditional students; and students who made changes in their choice of curriculum were more likely to be successful than students with original curriculum upon entry.

The stepwise logistic regression was employed to factors that most- or least influenced student success. The study shows that cumulative grade point average, cumulative credit hours, and semester credit hours attempted, were statistically significant at the 0.05 level and correlates of student success.

This study is of importance to institutional researchers and academic planners who struggle with the fundamental questions of institutional effectiveness and quality. Recent Student-Right-to-Know legislation and Graduate Rate Survey (GRS) by the federal government make this study increasingly more important to demonstrate public accountability. Perhaps more important the study can help shape broader assessment programs.

On the other hand, we found that we have little information about the students who were non-achievers. In particular, we would like to know more about their educational experiences at HCC. Did they earn a degree at another institution? To what extent and in what ways did their experience at HCC change their academic goals. What are the characteristics of the students who are achievers changing curriculum? To answer these questions it will be necessary to survey the students who left, and we hope to begin than research has a follow-up to this study.

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